



With every one?

1970 Annual Report
ELDORADO NUCLEAR LIMITED

(29245)

ELDORADO NUCLEAR LIMITED

ANNUAL REPORT

for the year ended December 31st, 1970

Contents

	Page
Directors and Officers	2
President's Letter	3
General Report	7
Financial Statements	
Income and Expense	9
Balance Sheet	10
Notes to Statements	12
Statement of Sales and Costs of Uranium Concentrates Procured from Other Producers	13
Statement of Retained Earnings	13
Auditor General's Report	13
Eldorado Aviation Limited Balance Sheet	14
Eldorado Aviation — Recoverable Expense	15
Eldorado Aviation — Auditor General's Report	15
Eldorado's Role in the Canadian Uranium Story	19

ELDORADO NUCLEAR LIMITED

Head Office: Suite 800, 151 Slater St., Ottawa, Canada, K1P 5H2
General Administration Office: Port Hope, Ontario, Canada

DIRECTORS

Marcel Bélanger W. J. Bennett Roger Blais W. M. Gilchrist*
W. F. James* W. S. Kirkpatrick Gordon Lawson*

*Members of Executive Committee

OFFICERS

President: W. M. Gilchrist
Vice-President, Marketing — J. C. Burger
Vice-President, Administration and Finance — C. Baschenis
Secretary: R. C. Powell Treasurer: J. C. Orr

DIVISIONAL MANAGERS

Mining and Exploration Division: C. F. Smith
Refining and Research: G. F. Colborne

DISTRICT OFFICES

Refining and Sales: Port Hope, Ontario — 885-4511
Beaverlodge Mine: P.O. Box 7010, Eldorado, Saskatchewan
Metallurgical Laboratories: Tunney's Pasture, Ottawa, Canada
Western Purchasing and Employment Office: 10040 - 105th Street, Edmonton, Alberta

ELDORADO AVIATION LIMITED

HEAD OFFICE: Suite 800, 151 Slater St., Ottawa, Canada, K1P 5H2
OPERATIONS OFFICE: No. 11 Hangar, Municipal Airport, Edmonton, Alberta

DIRECTORS

A. B. Caywood W. M. Gilchrist P. L. P. Macdonnell
L. R. Montpetit R. C. Powell

OFFICERS

President: W. M. Gilchrist
Secretary: R. C. Powell Treasurer: J. C. Orr
General Manager: G. F. Frank

Eldorado Nuclear Limited Sales Agencies Abroad
Europe: N.V. Internationale Ertshandel "Wambesco", P.O. Box 1439, Westerkade 2, Rotterdam, Netherlands
Japan: Marubeni-Iida Co., Ltd. P.O. Box Central 595, Tokyo.



W. M. Gilchrist

1970 ANNUAL REPORT
Eldorado Nuclear Limited

PRESIDENT'S LETTER

The Honourable J. J. Greene,
Minister of Energy, Mines and Resources,
Ottawa, Ontario.

Sir,

On behalf of the Board of Directors, and in accordance with Section 85 (3) of The Financial Administration Act, I have the honour to submit the Annual Report of Eldorado Nuclear Limited and of its subsidiary company, Eldorado Aviation Limited, for the year ended December 31, 1970.

Production of uranium in Canada for 1970 totalled 9,160,000 pounds (4580 tons) of U_3O_8 , about 3% above 1969 production and the highest output in Canada since 1964. Production came from three mines with a small contribution from a fourth which closed down during the year. Total uranium produced in the Western world was about 22,900 tons U_3O_8 in 1969, and information received to date suggests that this tonnage was not exceeded in 1970.

Shipments to the United Kingdom Atomic Energy Authority continued under the only contract remaining of those written in the 1950's. Only one company made deliveries to the Canadian government Stockpile, and as a result total Stockpile deliveries were again well below the permissible level. Four major contracts for Canadian uranium were written during the past year. These four contracts have doubled in one year the total quantity of Canadian uranium committed for delivery between 1971 and 1984. The amount which must now be delivered in that period totals approximately 143,000,000 pounds.

Nuclear Power

The rather depressing situation in the nuclear power field that was so evident during 1968 and 1969 gradually brightened in 1970. Many of the technical problems of manufacturing, construction and operating which have plagued the industry have now been largely overcome. Moreover, there is some evidence that the licensing

process which in the past has been very time-consuming will become much less complex as the body of manufacturing, construction and operating experience grows.

Increasing public concern about environmental pollution is being directed towards all sectors of industry, including the fledgling nuclear power industry. While this has caused serious disruptions in the siting and operation of some nuclear reactors, especially in the United States, it has stemmed largely from a lack of public understanding of the minimal effect that nuclear power plants have on their surroundings and their extremely low impact on our environment when compared with that of other industries. Obviously it is a responsibility of governments and the nuclear industries to inform the public concerning the nature of nuclear power reactors, and to assure the public that standards acceptable for human and ecological safety are being maintained.

During 1970, fourteen nuclear power plants came on stream in seven countries of the Western world with a total electrical power capability of 6,393 megawatts. It is significant that many of these new plants, as well as some of the earlier plants, have achieved electrical outputs well in excess of those forecast.

The increase in orders in 1970 for nuclear power reactors was most encouraging. In all, 29 plants with a total capacity of 25,158 megawatts were contracted for throughout the Western world during the year. This compares with 17 plants of 14,029 megawatts capacity ordered in 1969.

Within the United States, utilities ordered 16,700 megawatts capacity of nuclear power in 1970, over twice the capacity ordered in 1969. The U.S.A. now has 109 reactors with a total capacity of 86,893 megawatts operating, under construction, or on order. Forecasts of 20,000 megawatts to be ordered in 1971 would indicate that the U.S. is well on its way towards its goal of 150,000 megawatts of nuclear power by 1980.

Equally encouraging were the reports from other countries. With five reactors now operating, Japan has

confirmed plans for an additional 41 reactors, and plans to have 27,000 megawatts on line by 1980, second only to the United States. While the growth of nuclear power in western Europe has not been quite as rapid, there are indications that there will be a marked increase in 1971 orders over the previous year when only four reactors were committed. After a period of serious mechanical difficulties, Canada's first large power reactor at Douglas Point, Ontario, is now operating comfortably at design capacity and the first two units of the four 500 megawatt reactors in the Pickering complex should come on line in 1971.

Uranium Exploration and Development

Spurred by prospective requirements, exploration for uranium showed a sudden surge of activity in 1968 and 1969, and in some parts of the world, waned just as suddenly in 1970 when it became apparent that contracts with utilities were not forthcoming at adequate prices. In Canada, there was a general slowdown in uranium exploration activity and two mining companies temporarily suspended underground operations because lack of uranium contracts did not justify continuance.

In South Africa some mining companies were concerned that low prices coupled with uranium grades lower than anticipated were not providing an adequate return on invested capital. In Southwest Africa, attempts were being made to bring the large tonnage, low grade Rossing deposit into production by the mid-to-late 1970's. In 1971 production will start from the Arlit deposit in Niger, the first results of an exploration program which has been continuous since 1954. Late in the year three uranium deposits were recognized in the Northern Territories of Australia in a geological setting with a high potential for uranium resources. Although it is evident that considerable exploratory evaluation is still required in order to properly assess these finds, there seems no doubt that their actual contribution to world uranium reserves will be quite significant.

Exploration activity in the United States was also quieter in 1970, and it was evident that as in other countries, uranium producers were delaying the development of new properties. Exploration drilling declined to 23.5 million feet from the record 29.9 million feet drilled in 1969.

A report entitled "Uranium Resources, Production and Demand" published in September 1970 by a joint committee of the European Nuclear Energy Agency and the International Atomic Energy Agency lists Western world uranium reserves mineable at under \$10 (US) per pound as 840,000 short tons of U_3O_8 . This represents an increase of only 140,000 tons over the reserve published by the same organization in a similar report in December 1967, or an increase of only 20% after three years of relatively intensive exploration throughout the Western

world. Only a part of these reserves would be mineable at prices under \$8 (US) per pound. By comparison, the same E.N.E.A. reports show that during roughly the same three-year period, the electrical output from nuclear reactors has doubled, that it will re-double every two years until 1974, and again by 1977, and will reach 300,000 megawatts by 1980. It is therefore quite obvious that exploration results are not keeping pace with these growing requirements for uranium and that it will soon become necessary to mine existing reserves which will demand a price above \$8 (US) per pound.

Summation

Over the years we have repeatedly warned that a utility or a nation basing an appreciable and expanding portion of its electrical power requirements on nuclear energy must make sure that it has firm sources of supply for a major part of the reactor fuel which it will require for the life span of each reactor in its power complex. At the moment, the life span of a reactor for cost estimating purposes is placed at thirty years. This means that any reactor ordered in 1971 to come on line in 1975 will still be requiring fuel in 2005.

It should also be kept in mind that the price paid for a pound of uranium must be high enough to cover not only production and profit, but also compensate for the cost of finding and developing the orebody which contained that pound. The prices prevalent in today's period of uranium over-supply will not hold when demand equals or exceeds production.

We must reiterate that good management practice dictates that a utility which is embarking on a sizeable nuclear program should have on its advisory staff someone who is completely conversant with the problems of finding, developing and producing uranium oxide, and who is equally familiar with the changing patterns of supply and demand. The problems which have recently developed with regard to the supply of gas, oil, and coal should demonstrate to the utilities just how important it is for them to have a very clear knowledge of all problems pertaining to their supply of fuel.

In summary, it is apparent that many of the problems pertaining to nuclear power have for the most part been solved, and there should now be little or no impediment to its continued growth and the resulting benefits accruing to society.

Eldorado Operations

As forecast in last year's Annual Report, your company incurred a loss in 1970 greater than in 1969. Loss on operations was \$1,827,691, but the cost of servicing loans increased this to an overall loss of \$2,608,493.

Mining and Exploration

Mining operations continued on the reduced scale mentioned in the 1969 Annual Report, with a further reduction of 49 persons employed. Despite the de-

pressed uranium markets of the past few years and the consequent low volume of sales revenue, progress continues towards fulfilling the company's long-term objectives — the maintenance of adequate ore reserves, the improvement of processing procedures, and the maintenance and expansion of worldwide market contacts.

Exploration during the year was of a limited nature and was confined essentially to properties contiguous to the Beaverlodge and Hab mines.

Ore Reserves

In 1970, in an effort to reduce the unit cost of production, the number of tons mined was the lowest and the grade the highest in the past 15 years. Ore reserves, including the Hab mine, now stand at 3,915,300 tons of ore averaging 0.24%, after mining 333,906 tons in 1970. As compared with the position at December 31, 1969, this reserve represents a net increase during the year of about 5.5% in mineable U_3O_8 and now stands at its highest point in history.

The Nuclear Fuel Plant at Port Hope

As forecast, the new uranium hexafluoride plant was opened in 1970 and operations have proceeded normally, with indications that the plant will achieve a throughput in excess of its design capacity. The construction cost achieved was within the estimate, but operating costs were temporarily unfavourably influenced by the necessity to absorb a higher percentage of overall refinery fixed charges due to the shutdown of the chemical circuit of the zirconium plant.

Because of an excess in Western world capacity, the company's zirconium program is experiencing difficulty, and it was found expedient to close the plant temporarily. However, at year end, negotiations were underway which will, hopefully, lead to the operating of the plant at full capacity and the sale of the output at prices which may not be profitable, but which will be greater than the cash outlay involved in the operation; this would add to operating experience and help to place the company in a better position in regard to the longer term outlook which is excellent in terms of both volume and profitability. Meanwhile, the security of a Canadian supply of this vital element in the country's nuclear program is assured.

In the production and sales of natural and enriched UO_2 , the refinery in 1970 achieved an all-time high. The company's outstanding expertise in manufacturing this particular form of reactor fuel continues to be recognized by the industry both at home and abroad.

Research

The Research and Development Division continued its work of investigating methods of improving recoveries in the Beaverlodge mill. By late 1970 the conversion of the leaching pachucas to mechanical agitation had

resulted in a substantial improvement in uranium recovery from the refractory ores which now constitute a high percentage of the Beaverlodge reserves.

The Division was also deeply involved in the investigation of methods to make sure that effluents and stack discharges from the refinery would not be environmentally detrimental.

Requirements to borrow funds

It was noted in last year's Report that the company would need to add to its loans by about \$16,000,000 during 1970; the amount actually borrowed was slightly less at \$15,200,000. There will be a reduced requirement for loans in 1971, which are estimated as \$11,000,000 to carry forward the company's plan of operations.

The original investment in Eldorado by the Canadian Government amounted to \$9,246,877. Since then, funds paid in to the Receiver General in the form of dividends, redemption of shares, and income taxes have totalled \$63,710,000. In addition, \$4,045,000 has been contributed to revenues of the Province of Saskatchewan in the form of royalties, and the company has supported municipalities by way of grants in lieu of property taxes to an amount of about \$5,835,000.

Subsidiary Companies

Eldorado Aviation Limited, the company's wholly-owned subsidiary, again provided air support to Eldorado's mining and exploration activities, and served the needs of the company's other subsidiary, Northern Transportation Company Limited. For the first time since 1944, this latter company in 1970 failed to produce a profit reflecting the burden of servicing the debt arising out of the massive expansion programs of the past few years.

Organization and Personnel

During the year, Mr. L. R. Montpetit, formerly Assistant to the President for Transportation, was appointed Executive Vice-President of the subsidiary Northern Transportation Company Limited, and is now located in Edmonton.

The Board again takes pleasure in expressing to all personnel its sincere thanks for their constructive and effective efforts during the past year.

For the Directors,

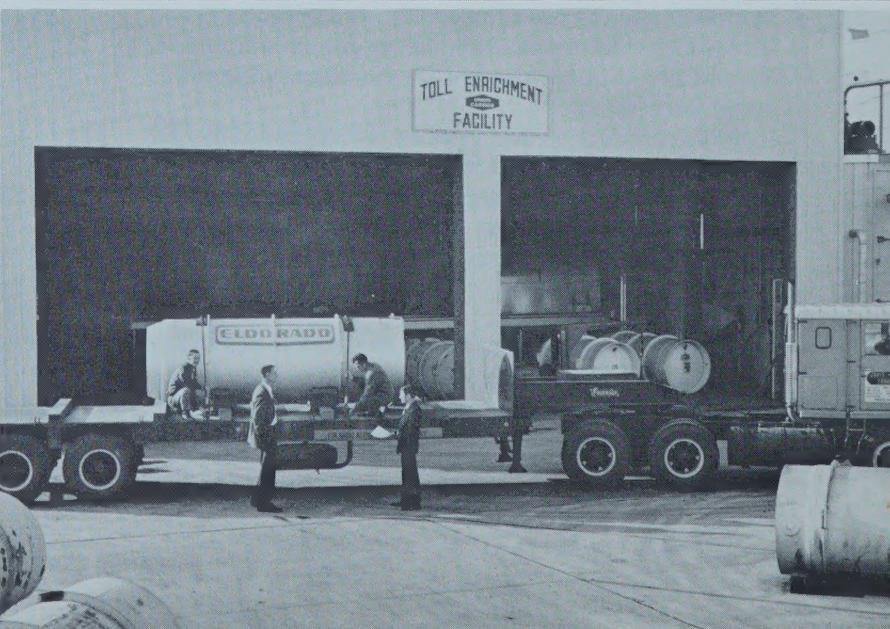
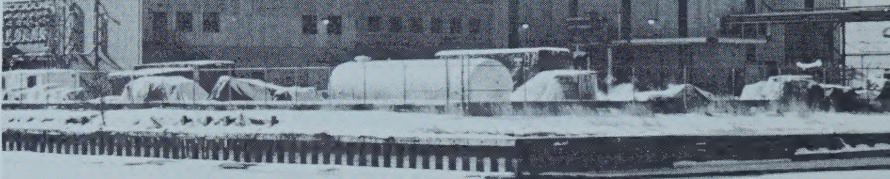
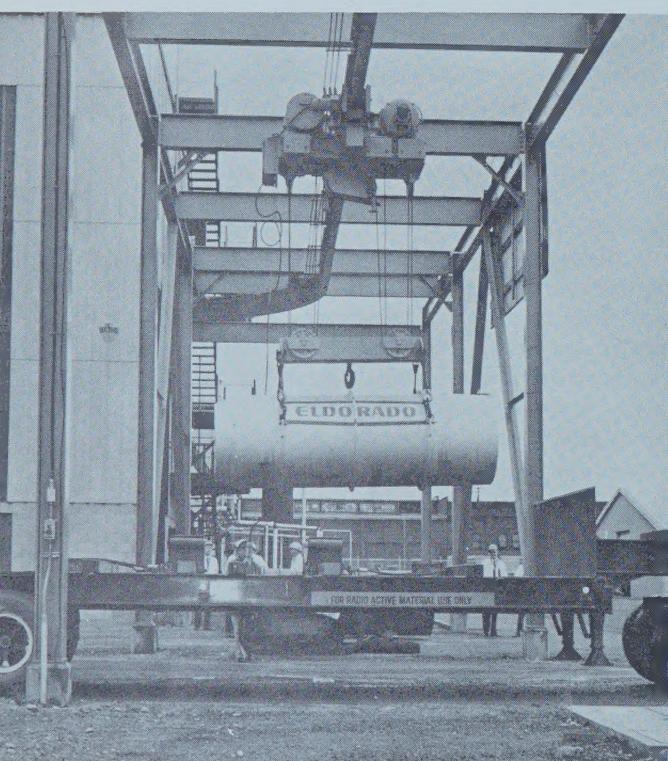
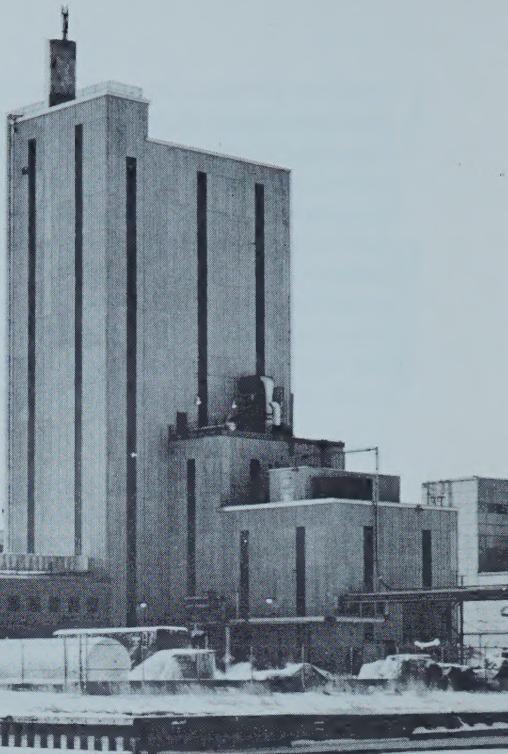
W. M. Gilchrist

President

Ottawa, Canada
March 2, 1971

Uranium Hexafluoride (UF_6)

Highlight of 1970 for Eldorado Nuclear Limited was the initial shipment, October 22, of Uranium Hexafluoride produced at its Port Hope, Ontario, Refinery. The new plant was completed and turned over to the Company on April 30. The demand for UF_6 was such that production had to be stepped up beyond target levels even before the plant was properly broken in and all problems solved, but the results were highly satisfactory. Additions to the facilities are planned to increase the output by mid-1972. Eldorado now produces ceramic grade natural Uranium Dioxide (UO_2); Uranium Trioxide (UO_3); and Uranium Hexafluoride (UF_6), the stage at which the element is converted into Enriched Uranium.



TOP — The central tower section of the Eldorado Uranium Hexafluoride plant at the Port Hope Refinery. The other pictures show the loading and transport of the chemical in 14-ton containers which move on huge tractor trailers, or by rail, from Port Hope to enrichment facilities in the United States. The Uranium Hexafluoride travels in solid form and virtually no hazard, from gamma ray emission or otherwise, is involved in its transport in the specially designed containers.

GENERAL REPORT

for the year ended December 31, 1970

ELDORADO NUCLEAR LIMITED
and its wholly-owned subsidiary
ELDORADO AVIATION LIMITED

This general report deals with the operations of both Eldorado Nuclear Limited and its wholly-owned subsidiary Eldorado Aviation Limited, for the year ended December 31, 1970.

Income

The Company experienced an operating loss of \$1,827,691 during 1970 as compared to \$1,379,407 in 1969. Volume of sales increased by 50% over the previous year but costs of sales and services were higher by 80% due in large part to substantial expenses which were incurred in the early operation of the new zirconium and uranium hexafluoride plants. Non-operating costs in 1970 included \$1,473,667 interest on loans, up from \$233,407 in 1969, and contributed greatly to the Company's net loss of \$2,608,493 for the year, compared to \$1,218,785 for 1969.

Capital Expenditures

At the Port Hope refinery an amount of \$2,421,190 was expended in 1970 towards completion of the uranium hexafluoride plant which commenced operation successfully in late summer. Other general capital costs at the refinery totalled \$266,470. The Beaverlodge mine required plant expenditures amounting to \$558,168, with the major portion allocated to the modification of pachuca tanks to achieve improved uranium extraction. Capital expenditures for 1971 are estimated to total about \$3,800,000 and include plans to commence expansion of the uranium hexafluoride plant to double its present capacity.

Mining and Exploration Division, Saskatchewan

Mining

It will be recalled that in 1969 a major decision was made to curtail production for the 5-year period ending in 1973, with a view to keeping the unit cost of U_3O_8 within forecast price ranges in that period, and to minimizing cash requirements, while still maintaining

the mine in condition to move quickly to higher output when the upturn comes. The year under review was the second year of the 5-year period in which these objectives have been pursued.

Production of U_3O_8 in 1970 was about 2% below that of 1969 — 1,531,893 pounds from 333,906 tons of ore treated, compared with 1,562,357 pounds from 456,156 tons treated in 1969. Operating cost per ton milled increased by some 11% over 1969, but due to the higher grade of ore milled, the cost per pound of U_3O_8 produced was approximately 17% lower than in that year.

Comparative production statistics, not including custom ore treated, are as follows:

	Tons of Ore Treated	Pounds of U_3O_8 Recovered	Average Recovery Pounds Per Ton
1970*	333,906	1,531,893	4.59
1969	456,156	1,562,357	3.43
1968	626,615	2,001,648	3.19
1967	561,434	2,003,369	3.57
1966	511,446	1,687,501	3.30
1965	536,132	1,800,467	3.36
1964	522,148	1,837,029	3.52
1963	544,177	1,855,212	3.41
1962	563,580	1,959,788	3.48
1961	542,157	2,214,894	4.09
1960	625,127	2,454,400	3.93
1959	657,521	2,392,770	3.64
1958	676,354	2,507,663	3.71
1953-7	1,206,309	5,071,265	4.20
1953-70 inclusive	8,363,062	30,880,256	3.69

*Includes Hab mine

Ore reserves of the various orebodies making up the Beaverlodge and Hab mines amounted to 3,915,300 tons averaging 0.24% U_3O_8 , as at December 31, 1970. The comparable figures a year earlier were 3,440,000 tons averaging 0.23%. The current reserves are the highest in history.

During 1971, a major underground development will commence, as sinking begins on a new internal shaft, or winze, to carry the mine to the 34th level and to a vertical depth of 5,451 feet.

Exploration

Exploration activities in 1970 were substantially reduced and no significant discoveries were made. Prospecting, geological mapping and diamond drilling on claims contiguous to the existing mine property accounted for most of the work, the objective of which was primarily the fulfilling of work requirements to hold areas previously staked. No major exploration activity is planned for 1971.

The Operations at Port Hope, Ontario

The most notable feature of the refinery operations in 1970 was the completion of construction and the startup of the uranium hexafluoride plant. It was officially accepted by Eldorado on April 30th and the first shipment of UF₆ left the plant on October 22nd. Production targets for 1970 were revised upwards late in the year as many customers tried to have conversion services performed before a scheduled price increase took effect at the American enrichment plants. This situation created a "rush" operation in the plant before it was properly broken in and all problems satisfactorily solved. In general, the startup and production operations in 1970 were well carried out and all targets attained.

Operations in the zirconium plant continued to improve throughout the early part of 1970 but many serious problems remained. Production requirements were low and the circuit was changed from continuous to stepwise or "block" operation in April. This method allowed the various pieces of equipment to be down for longer maintenance periods while still keeping up with required production levels. This situation continued until mid-October when lack of orders made it necessary to shut down the entire chemical circuit, and this made it possible to release experienced operators for the UF₆ plant startup. During 1970 the customers' specified level of hafnium in zirconium metal was reduced from 200 to 50 ppm throwing an added burden on the zirconium chemical operations. In general, an excellent job was done in altering production methods to achieve this higher standard. The zirconium metallurgical circuit performed all the required operations on the metal and the results were good. All of the finished zirconium alloys shipped from the plant were on specification chemically and the metal working characteristics have proved entirely satisfactory to the fabricators.

The natural UO₂ circuit operated at or near capacity all year and the product quality remained high. A large drier installation increased capacity by some 50% and at year end was operating satisfactorily.

Enriched uranium operations were active in 1970 and all orders were completed on schedule. The Criticality

Committee ensured that a critically safe operation was maintained at all times.

The Special Projects group continued the fuel development work for Atomic Energy of Canada Limited along with the production of various depleted uranium castings for a wide variety of customers. Casting of the natural uranium billets for the Taiwan reactor was begun in late 1970.

An intensive examination of all the refinery operations with respect to possible pollution of the environment was continued during 1970. In connection with this, close liaison was maintained with the Ontario Water Resources Commission and an active sampling, analytical and research program was carried out.

At year-end, negotiations were almost complete for the purchase of an adjacent vacant industrial property which will be available for future expansion projects and in the meantime will provide much-needed storage facilities.

Sales and Promotion

The marketing staff were again active during the year in all product fields. In order to assist in the development of markets in the United States, a resident representative was engaged. The company now has resident representation in Europe, Japan and the United States.

As already noted, sales of ceramic grade UO₂, both natural and enriched, reached an all-time high in 1970. However, indications are that the demand for this product for the Canadian nuclear programs may be somewhat reduced over the next three years.

Development work on new fuels has resulted in a contract for the supply of enriched uranium carbide for the WR-1 reactor of AECL at Whiteshell, covering a five-year period. A contract with Canadian Westinghouse for the supply of uranium metal for the Taiwan reactor was signed with deliveries scheduled for 1971.

World-wide marketing efforts in the field of UF₆ conversion and sales have met with considerable success. A number of contracts have been signed, covering the years 1971 through 1978. Several other contracts are at present under negotiation.

A requirement for depleted uranium metal in cast shapes for spent fuel casks and shielding material, appears to be developing, and sales should be realized in the near future.

The prime concern of the Marketing Division in the immediate future is the sale of UF₆ conversion services to assure the continuous full utilization of the company's present plant and of the additional capacity to be made available by the proposed doubling of the plant in 1972.

General Report Continued on Page 18

ELDORADO NUCLEAR LIMITED

Statement of Income and Expense

for the year ended December 31, 1970

(with comparative figures for the year ended December 31, 1969)

	1970	1969
Income:		
Sales — Company's products and services	\$ 5,637,284	\$ 3,760,781
Expense:		
Cost of products and services sold	6,180,593	3,432,953
Scientific research	623,199	696,436
Administration	331,711	421,345
Exploration	62,477	392,346
Marketing	266,995	197,108
	<hr/> 7,464,975	<hr/> 5,140,188
Net loss from operations	1,827,691	1,379,407
Other Income and Expense:		
Income arising from the ore procurement program	655,709	185,664
Interest and other non-operating income	104,545	267,461
	<hr/> 760,254	<hr/> 453,125
Less:		
Interest on loans from Canada	1,473,667	233,407
Other non-operating expense	67,389	59,096
	<hr/> 1,541,056	<hr/> 292,503
Net other expense	780,802	(160,622)
Net Loss	<hr/> \$ (2,608,493)	<hr/> \$ 1,218,785

The accompanying notes are an integral part of the financial statements.

BALANC

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(with comparative figu

ASSETS

1970 1969

Current Assets:

Cash	\$ 235,914	\$ 478,309
Short-term bank deposits	2,000,000	—
Accounts receivable	2,624,272	1,187,012
Advances in respect of concentrates to be received	932,847	1,192,154
Concentrates and refinery products valued at lower of cost or realizable value	35,092,117	27,648,531
Operating and general supplies, at cost	3,169,629	3,548,543
Prepaid expenses	223,013	203,791
	<u>44,277,792</u>	<u>34,258,340</u>
Deferred accounts receivable in respect of concentrates delivered (Note 1)	4,999,396	5,950,125
Advances in respect of concentrates to be received in later years	—	932,847
	<u>4,999,396</u>	<u>6,882,972</u>

Investments and Loans:

Investments in wholly-owned subsidiary companies, at cost (Note 2) ...	187,153	187,153
Employees' housing loans	89,282	128,132
Municipal Corporation of Uranium City and District, 5% to 8 1/4 % debentures, maturing 1975-88	753,815	817,655
	<u>1,030,250</u>	<u>1,132,940</u>

Unamortized Expense:

Pre-production and mine development costs	7,742,342	6,059,499
Excess of costs and expenses over sales of concentrates procured from other producers (Note 3)	622,938	1,281,504
	<u>8,365,280</u>	<u>7,341,003</u>

Capital Assets:

Property, plant and equipment, at cost	75,122,282	71,989,058
Less: Accumulated depreciation	47,789,419	46,835,165
	<u>27,332,863</u>	<u>25,153,893</u>
	<u>\$ 86,005,581</u>	<u>\$ 74,769,148</u>

The accompanying notes are an integral part of the financial statements.

Approved on behalf of the Board

W. M. GILCHRIST, Director

W. F. JAMES, Director

Clear Limited

(Canada Corporations Act)

BALANCE SHEET

March 31, 1970

(At December 31, 1969)

LIABILITIES

	1970	1969
Current Liabilities:		
Accounts payable	\$ 6,896,596	\$ 5,128,582
Loans from Canada due within one year (Note 4)	4,392,314	2,600,000
Advance payments in respect of concentrates to be delivered	1,570,972	2,016,278
	<hr/> 12,859,882	<hr/> 9,744,860
Advance payments in respect of concentrates to be delivered in later years ..	2,886,444	3,690,240
Deferred accounts in respect of purchase and development programs	<hr/> 1,025,661	<hr/> 1,708,318
Loans from Canada (Note 4)	<hr/> 20,849,764	<hr/> 8,633,407
Capital:		
Capital stock:		
Authorized — 110,000 shares of no par value		
Issued — 70,500 shares, fully paid	6,586,080	6,586,080
Retained earnings	41,797,750	44,406,243
	<hr/> 48,383,830	<hr/> 50,992,323
	<hr/> \$ 86,005,581	<hr/> \$ 74,769,148

I have examined the above Balance Sheet and the related Statement of Income and Expense and have reported thereon under date of March 1, 1971 to the Minister of Energy, Mines and Resources.

A. M. HENDERSON,
Auditor General of Canada

Eldorado Nuclear Limited

Notes to Financial Statements

1. Deferred Accounts Receivable

These are receivable under a contract which provides for payment to be made following shipment of products as required during the period 1972-75.

2. Subsidiary Companies

The assets, liabilities, income and expense of the Company's two wholly-owned subsidiaries, Eldorado Aviation Limited and Northern Transportation Company Limited have not been included in the financial statements of Eldorado Nuclear Limited.

The net expenses of Eldorado Aviation Limited are recovered from Eldorado Nuclear Limited and Northern Transportation Company Limited. The aggregate undistributed surplus of Northern Transportation Company Limited as at December 31, 1970 amounted to \$7,820,314.

All three companies are Crown corporations as defined by section 76(c) of the Financial Administration Act, and as such each is required to report annually to the appropriate Minister in compliance with the provisions of that Act.

3. Excess of Costs and Expenses over Sales of Concentrates procured from other Producers

The balance of \$622,938 will be amortized over the remaining deliveries of concentrates to be made to the United Kingdom Atomic Energy Authority, scheduled for completion by February 29, 1972.

4. Loans from Canada

In the fiscal years 1968-69, 1969-70 and 1970-71 the Company has been authorized to borrow up to aggregate amounts not exceeding \$35,000,000 subject to certain terms and conditions prescribed by the Governor in Council. Of this amount \$26,200,000 has been borrowed and a further \$5,300,000 is available to the Company, the balance of \$3,500,000 authorized in 1969-70 is no longer available. A total of \$2,427,669 has been repaid in respect of the 1968-69 and 1969-70 borrowings and \$4,392,314, including interest of \$666,120 is repayable in 1971. The remainder of \$20,849,764, including interest of \$803,627 is repayable by December 31, 1975.

5. Government of Canada Stockpile Program

The Treasury Board, with the approval of the Governor in Council, has granted authority for Eldorado Nuclear Limited to purchase and stockpile uranium bearing concentrates for the Government of Canada. At December 31, 1970 the Company was the custodian of concentrates thus acquired at a cost of \$101,178,132. The cost of these concentrates, being chargeable to parliamentary appropriations, is therefore not included in the accounts of the Company.

6. Supplementary Information

The accounts for 1970 include the following: depreciation, \$1,005,038; and remuneration of directors as directors, officers or employees of the Company, \$46,000.

ELDORADO NUCLEAR LIMITED

**Statement of Sales and Costs
of Uranium Concentrates procured
from other Producers**

for the year ended December 31, 1970

Sales of concentrates	\$ 15,522,831
Cost of concentrates sold	14,208,556
	<hr/>
	1,314,275
Amortization of excess of costs and expenses over sales of concentrates procured from other producers	658,566
Net income to Company operations	<hr/> \$ 655,709

The accompanying notes are an integral part of the financial statements.

ELDORADO NUCLEAR LIMITED

Statement of Retained Earnings

for the year ended December 31, 1970

(with comparative figures for the year ended December 31, 1969)

	1970	1969
Balance at January 1	\$ 44,406,243	\$ 45,625,028
Net loss for the year	<hr/> 2,608,493	<hr/> 1,218,785
Balance at December 31	<hr/> \$ 41,797,750	<hr/> \$ 44,406,243

The accompanying notes are an integral part of the financial statements.

**AUDITOR GENERAL
OF CANADA**

Ottawa, March 1, 1971.

The Honourable J. J. Greene,
Minister of Energy, Mines and
Resources, Ottawa.

Sir,

I have examined the accounts and financial statements of Eldorado Nuclear Limited for the year ended December 31, 1970. My examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as I considered necessary in the circumstances.

In compliance with the requirements of section 87 of the Financial Administration Act, I report that, in my opinion:

- (a) proper books of account have been kept by the Company;
- (b) the financial statements of the Company
 - (i) were prepared on a basis consistent with that of the preceding year and are in agreement with the books of account,
 - (ii) in the case of the balance sheet, give a true and fair view of the state of the Company's affairs as at the end of the financial year, and
 - (iii) in the case of the statement of income and expense, give a true and fair view of the income and expense of the Company for the financial year; and
- (c) the transactions of the Company that have come under my notice have been within the powers of the Company under the Financial Administration Act and any other Act applicable to the Company.

Yours faithfully,
A. M. HENDERSON,
Auditor General of Canada.

ELDORADO AVIATION LIMITED

(Incorporated under the Canada Corporations Act)

Balance Sheet

at December 31, 1970

(with comparative figures at December 31, 1969)

ASSETS		LIABILITIES			
	1970	1969			
Current Assets:		Current Liabilities:			
Cash	\$ 45,828	\$ 45,761	Accounts payable	\$ 25,190	\$ 21,925
Accounts receivable:					
Eldorado Nuclear Limited	29,476	23,831			
Northern Transportation Company Limited	17,906	6,567			
Other	10,031	4,566			
	57,413	34,964			
Operating supplies, at cost	77,167	69,815			
Prepaid insurance	31,957	26,043			
Total Current Assets	212,365	176,583			
Capital Assets, at cost:			Capital:		
Aircraft, including major spare parts	999,947	1,010,103	Capital Stock:		
Shop, hangar, and loading equipment, etc.	46,521	46,416	Authorized – 50,000 shares of \$1 each		
Office furniture and equipment	9,752	9,752	Issued – 28,006 shares, fully paid .	28,006	28,006
	1,056,220	1,066,271	Surplus:		
Less: Accumulated depreciation	958,350	938,532	Balance at January 1	254,391	254,391
	97,870	127,739	Profit on sale of capital assets	2,648	—
	\$ 310,235	\$ 304,322	Balance at December 31	257,039	254,391
				\$ 310,235	\$ 304,322

Approved on behalf of the Board

W. M. GILCHRIST, Director

A. B. CAYWOOD, Director

I have examined the above Balance Sheet and the related Statement of Recoverable Expense and have reported thereon under date of March 4, 1971 to the Minister of Energy, Mines and Resources.

A. M. HENDERSON
Auditor General of Canada

AUDITOR GENERAL
OF CANADA

ELDORADO AVIATION LIMITED

Statement of Recoverable Expense

for the year ended December 31, 1970

(with comparative figures for the year ended December 31, 1969)

	1970	1969
Salaries and wages	\$ 407,315	\$ 384,679
Employee benefits	43,901	40,408
Supplies	176,165	195,885
Repairs	163,797	137,754
Hangar expense	47,309	48,191
Insurance	37,607	39,234
Depreciation	30,171	31,872
Landing fees	14,788	16,327
Travel	2,202	3,211
Miscellaneous	13,191	14,503
	<hr/> 936,446	<hr/> 912,064
Miscellaneous income	34,087	39,978
Net expense	<hr/> \$ 902,359	<hr/> \$ 872,086

Note: The above net expense was recovered from:

Eldorado Nuclear Limited	\$ 716,140	\$ 736,895
Northern Transportation		
Company Limited	186,219	135,191
	<hr/> \$ 902,359	<hr/> \$ 872,086

Ottawa, March 4, 1971.

The Honourable J. J. Greene,
Minister of Energy, Mines and
Resources, Ottawa.

Sir,

I have examined the accounts and financial statements of Eldorado Aviation Limited for the year ended December 31, 1970. In compliance with the requirements of section 87 of the Financial Administration Act, I report that, in my opinion:

- (a) proper books of account have been kept by the Company;
- (b) the financial statements of the Company
 - (i) were prepared on a basis consistent with that of the preceding year and are in agreement with the books of account,
 - (ii) in the case of the balance sheet, give a true and fair view of the state of the Company's affairs as at the end of the financial year, and
 - (iii) in the case of the statement of recoverable expense, give a true and fair view of the expense of the Company for the financial year; and

- (c) the transactions of the Company that have come under my notice have been within the powers of the Company under the Financial Administration Act and any other Act applicable to the Company.

Yours faithfully,

A. M. HENDERSON
Auditor General of Canada.



The Gentilly Nuclear Power Station achieved criticality for the first time on November 12, 1970 — right on schedule. The 250 MWe station, located on the St. Lawrence River, across from Trois Rivières, is the first nuclear station in the Hydro-Québec system, and the world's first light water cooled, heavy water moderated, and natural uranium fuelled power reactor. The station will gradually work up to full power production in late 1971.



PROGRESS in the Nuclear Power Field

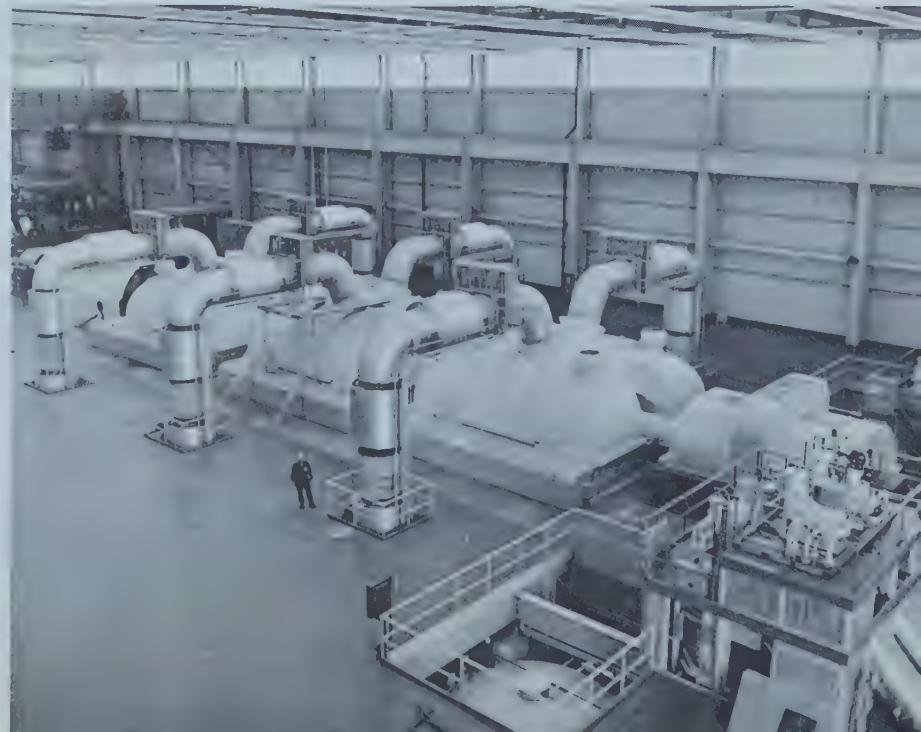
Fourteen new nuclear power plants went on stream in 1970 in seven countries of the Western world, and contracts for 29 more, with total capacity of 25,158 megawatts, were issued. The U.S.A. now has 109 reactors operating, under construction or ordered. The market prospects for Uranium fuel have brightened and Eldorado will share in the increasing demand.

Moving rapidly in development of nuclear power sources, Japan is a major customer for Uranium. This is the Fukushima No. 1 Nuclear Plant of Tokyo Electric Power Co.



Scheduled to produce first power in 1971, the four-reactor nuclear power station of Ontario Hydro-Electric Power Commission on the shore of Lake Ontario in Pickering Township has an installed capacity of 2,160,000 kilowatts. The site is dominated by the large vacuum building, nearest to the lake, and the four reactor domes. The plant has an estimated cost of \$662 million. BELOW — Cleaning one of the first fuel bundles for Unit One at Pickering; and a view of generating Unit No. 1, with 540,000 kilowatt capacity.

Photos Courtesy of Ontario Hydro



GENERAL REPORT

Continued from Page 8

Research and Development Division

Refinements to the alkaline leaching process were developed to adapt it for refractory Fay ore and assistance was provided in the application of the changes at the Beaverlodge mill. By year end the mill installation was complete and satisfactory results were being obtained. Further innovations related to the mill process are under investigation, particularly with respect to economies in reagent and energy requirements.

Technical assistance was provided in problems encountered in the start-up of the UF₆ plant. This included assessment and definition of problem areas. Testwork was carried out to develop economic effluent treatment methods for the new plant.

Effluent treatment became generally more urgent during the year with attention being given to both Beaverlodge and Refinery problems. Processes and facilities for uranium and zirconium effluent requirements at Port Hope will continue to require a major R & D effort to meet the high standards being set by environmental control agencies.

There was a decrease in the volume of research and development work for outside companies during the year. The policy of providing assistance on a contract basis is being continued and increased activity may be anticipated as economic factors change.

Uranium Procurement

Eldorado's function as the official representative of the Government of Canada in the administration of the stockpiling program was concluded as of June 30, 1970, when all deliveries made under the first two stockpiling programs were completed.

During 1970, deliveries to the second stockpile amounted to 1,474,488 pounds of U₃O₈. The two stockpiles, contributed to by four producers in the period 1963-70, now contain U₃O₈, partially in the form of UO₃, valued at approximately \$101,000,000.

Of the deliveries by Canadian uranium producers to the United Kingdom Atomic Energy Authority under the 12,000-ton contract of 1962, only some 1,132 tons remain to be delivered.

Organization and Manpower

The company's work force at December 31, 1970 numbered 5% fewer persons than at year end 1969, as

shown in the following table:

	Hourly-Rated	Salaried	1970	Totals 1969
Beaverlodge Operation	290	152	442	491
Port Hope Refinery	196	93	289	270
Research & Development		38	38	50
Marketing		7	7	7
Edmonton Office		8	8	8
Head Office		22	22	24
	486	320	806	850

The company's total payroll in 1970 amounted to \$7,632,526, as against \$8,729,470 in 1969. Contributions to the company pension and employee group insurance and medical insurance plans totalled \$461,194 compared with \$514,500 in 1969.



Eldorado Aviation Limited

This wholly-owned subsidiary provides contract air service to the parent company and to Northern Transportation Company Limited, under a Class 5 licence from the Canadian Transport Commission. Flying time of the company's aircraft was some 9% less than in the previous year.

The DC-4 aircraft operated most of the year on a "main-line" service between Edmonton and the parent company's mine in northern Saskatchewan. One DC-3 was used in servicing the needs of agencies of the Northern Transportation Company throughout the Mackenzie river valley and in the western Arctic and to Alaska. The company's second DC-3 was leased for a short period, but was also used on ice reconnaissance in the Arctic. The Bell and S-55 helicopters were used to provide the necessary servicing of hydro lines, hydro plants, and exploration parties, and on ice reconnaissance.

Mileage flown by fixed wing aircraft decreased by 2% from 1969 and ton-miles were down by 8% with an increase in cost per ton-mile of some 19%.

At the end of 1970, the staff numbered 36, including three working part-time. Salaries and wages amounted to \$391,785, and company contributions to group welfare and pension plans were \$36,421.

Eldorado's Role in the Canadian Uranium Story

Eldorado Nuclear Limited is the pioneer of the Canadian nuclear industry. It also is the only fully-integrated uranium company in the Western World, embracing mining, exploration, refining, research and marketing. Since 1954 alone this Crown-owned corporation has generated one-sixth of the two billion dollars brought into the Canadian economy by the sale of uranium.

The original investment by the Government of Canada in acquiring Eldorado amounted to \$9,246,877. Since then, funds paid into the Receiver General in the form of dividends, redemption of shares, and income taxes had totalled \$63,710,000 to the end of 1970. An additional \$4,045,000 has been paid to the Province of Saskatchewan in the form of royalties, and the Company has supported municipalities by way of grants in lieu of property taxes to an amount of \$5,835,000.

Eldorado's original mine at Port Radium on Great Bear Lake was exceedingly rich in uranium content, but the ore deposit eventually ran out and the operation closed down in 1960. In the meantime, however, the Company's prospectors had found important deposits in the Lake Athabasca region, leading to development of the Beaverlodge Mine which went into production in 1953. It has been maintained at a high level of efficiency and when market demand warrants, again will be one of Canada's major producers. Its ore reserves are at a record high.

The small refinery at Port Hope, Ontario, has grown since 1944 into a large and versatile facility processing ore concentrates through the various stages of Uranium Dioxide, Uranium Trioxide and Uranium Tetrafluoride up to Uranium Hexafluoride, the "raw material" for final enrichment. The Port Hope plant also produces and fabricates Uranium and Zirconium metals and alloys. Eldorado's research laboratories have over a period of many years made important contributions to the technologies of ore production and processing, and to the refining procedures and the adaptation of end-products to ultimate use.

Like many other organizations in its field, Eldorado Nuclear Limited has gone through a period of pause and consolidation since the tapering-off of the boom demand for uranium in the late 1950's and early 1960's, but has taken advantage of the opportunity to improve facilities and technologies in preparation for the upturn, already apparent, in the demands of the Western World for more and more fuel for the nuclear reactors which eventually will provide a significant part of the total requirement for electrical energy.

A Romantic Saga

The story behind Eldorado Nuclear Limited is a romantic and exciting one. It blends the elements of high adventure, of chance discovery, of mystery, of frustrations and failures and rich reward. Indirectly, it played a part in the decisive conclusion of World War II, and in the past 30 years has contributed to what may prove to be one of the greatest boons to humanity, the application of nuclear energy to the furtherance of peace and progress.

The whole story encompasses but a brief span. Until 1945 it is doubtful if more than one of every 50,000 people

in the world had even heard of uranium. The word had been in the textbooks since discovery of the element in 1789 by a German chemist, Klaproth, but uranium remained a mere laboratory curiosity for more than a century. In 1896 Henri Becquerel of France learned by mere chance that pitchblende, the ore of uranium, emitted radiations not unlike those of X-rays discovered by Röntgen. His published observations set the Curies on the path to an important scientific achievement.

The Curies discovered radium and its transformation product, polonium. They demonstrated that radium exists in all naturally-occurring uranium in the ratio of about one part in 3,000,000, and accounts for its radioactivity.

After it became known that radium would have important applications in the treatment of diseases, particularly tumors and cancers, as well as a number of uses in industry, demand created a fantastic value for the few grains — not grams — that could be derived annually from the only known source of pitchblende, a primitive mine at Joachymsthal in Bohemia. A quarter-gram was worth \$50,000 in the early 1900's, probably equal to \$300,000 of today's inflated dollars.

When mines were developed in the United States, about 1912, radium became more readily available and the price came down to about \$125,000 a gram, or \$3,500,000 per ounce. Early in the 1920's a Belgian syndicate developed a mine in the Congo and, with substantial quantities of ore and new and better methods of refining, was able to stifle U.S. competition and enjoy a virtual world monopoly at a price of about \$70,000 a gram.

Abundant, But Hard to Find

Paradoxically, the element uranium is known to occur under such a variety of geological conditions that it could probably be found in small quantities in almost any part of the world. At least traces of uranium and its cousin element, thorium, are found in all the igneous rock of the world's crust and in all its rivers and seas.

Geologically, uranium is less abundant than copper, nickel or zinc, but more abundant than gold or silver. This abundance, of course, is a relative thing. A deposit containing one-tenth of one percent uranium dioxide represents a concentration about 300 times the average abundance in the earth's crust. By far the greater part of Canada's ore reserves average only 0.1 percent uranium oxide.

Generally speaking, the geology of Canada is favorable to the finding of large and relatively rich deposits of uranium, if enough time, money and technical knowledge are applied to the search. Uranium is never found in nature in the metallic state, but always occurs in combination with oxygen as oxides or silicates.

Gilbert Labine's Lucky Strike

While undoubtedly many Canadian prospectors in the first 30 years of this century had hopeful dreams of stumbling upon a "radium mine," not one in 1,000 had the slightest idea what to look for or how to recognize pitchblende. Gilbert Labine was an exception. While he was

learning the prospector's trade in Cobalt as a comparative youth, an experienced old-timer had passed on what he knew about uranium.

In the late 1920's Mr. Labine undertook aerial prospecting in the Far North and was rewarded with the finding not only of silver and cobalt along the eastern shore of Great Bear Lake, but of substantial quantities of pitchblende. Prospecting alone along a rocky outcropping that bore the bloom of cobalt, he picked up a sample "about the size of a plum" of an unfamiliar, dark-colored ore. It was his lucky strike. The "plum" was pitchblende.

Claims were staked and development of the mine was begun as quickly as equipment could be brought in. Initial operations were directed mainly towards the silver, cobalt and gold values in the ore, but it soon became apparent the real wealth of the mine lay in the pitchblende.

A small refinery was established by Eldorado at Port Hope, Ontario, almost 3,000 miles from the mine. It was cheaper to transport the ore concentrates to Port Hope than to ship building materials, equipment and large tonnages of chemicals and supplies to the remote North.

Shipment of concentrates by air, water and rail began in 1932. The relatively primitive refinery produced a minute quantity of radium for its first shipment in 1933, and in November, 1936, completed production of its first ounce (28 grams). By 1938 a monthly output of 2.5 grams was reported. The actual product of the refinery was radium bromide of 90 per cent purity, which was sent to England for accurate determination of radio-active content, final refinement, and preparation into usable form.

Concurrent with the production of radium through the 1930's, Eldorado had sold significant quantities of silver from the mine and had developed a small market for uranium salts, mainly for use in the coloring of glass and ceramics. The price of these salts ranged from \$2.50 to \$2.92 per pound in 1938.

Eldorado Becomes a Crown Company

For the first ten years of its existence, Eldorado paid scant attention to uranium as such, other than in its relationship to radium, because there was no demand for it. All this changed.

Although the amounts involved seem relatively small, the rising Canadian production of radium in the mid-1930's had broken the Belgian monopoly and the price dropped rapidly. In 1940 demand had diminished, substantial inventories were on hand, labor was scarce. Eldorado shut down the Port Radium mine and reduced its refinery operations.

Two years later, shrouded in ultra-secrecy, the Manhattan Project created an urgent demand for uranium in quantity. This was the joint British-United States-Canadian undertaking which eventually brought forth the atomic bomb. Canada's role was to supply part of the uranium. The remainder came from the Belgian Congo. The Government requested the re-opening of the Port Radium mine on an emergent basis, but gave no hint as to the reason. The mine and mill, as well as the Port Hope refinery, were in full operation by late 1942. Shipments of uranium were made, but it is believed that the material used for the first atomic bomb was not of Canadian origin.

Late in 1943, when it became evident that the atomic bomb would be feasible, the three governments concerned decided that they should at once gain complete control of uranium sources within their respective territories. On January 28, 1944, Eldorado was expropriated and the operation was taken over by the Crown-owned Eldorado Mining and Refining (1944) Limited. Northern Transportation Company Limited, a wholly-owned subsidiary of Eldorado, was one of the assets acquired.

The Uranium Boom of the 1950's

Eldorado continued to be Canada's sole producer of uranium until cold war demands in the early 1950's spurred the discovery and development of other major deposits, especially in the Blind River and Bancroft areas of Ontario and the Beaverlodge region of Northwestern Saskatchewan.

As the Canadian government's agency, Eldorado played a major role in the development of the fledgling industry, by making available its know-how in the prospecting, mining and metallurgical fields, and by negotiating and administering contracts for the sale of uranium by the private producers to agencies of the U.S. and U.K. governments. These services were provided by Eldorado without profit or fee. By 1958 there were 25 producing mines in Canada, and the peak output of almost 31,000,000 pounds was attained the following year.

The "uranium boom," as it is often called, gave the Canadian economy a decided boost for more than a decade. From 1955 to the end of last year, industry sales had exceeded 200,000,000 pounds of U_3O_8 , valued at more than two billion dollars. The annual volume has dwindled sharply since the peak year and for several years past much of the diminished output has gone into Canadian Government stockpiles which now have a value of about \$101 millions.

There have been an increasing number of contracts for delivery of Canadian uranium for nuclear power reactors. The amount involved is significant, though not comparable to the volume of the big contracts previously in effect, but the industry's future continues to brighten.

Nuclear reactors in Canada are designed to use natural uranium, whereas most reactors in the United States and elsewhere abroad employ enriched uranium, a form not produced in this country. In 1970 Eldorado completed construction of a plant at its Port Hope refinery to produce Uranium Hexafluoride and since October has been making regular deliveries of this product to United States enrichment plants. Demand is such that the capacity of the Hexafluoride plant will have to be increased and perhaps doubled by mid-1972.

History of Eldorado Aviation Limited

The remoteness of the Port Radium mine made air transportation essential from the beginning. In 1944 Eldorado bought its own aircraft to assist in field exploration work and the movement of personnel, perishable goods, and emergency supplies. The service was expanded and a regular schedule instituted with the inception of the Beaverlodge mine, and in 1953 the Aviation Division was incorporated as a wholly-owned subsidiary, Eldorado Aviation Limited. It provides air service at cost for Eldorado and its other subsidiary, Northern Transportation Company Limited.

